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NATIONAL FOREST RESOURCES OF UTAH

Prepared by the Forest Service

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Population and development in Utah have always clung close to the higher mountain ranges, for here are the sources of the fundamental wealth of the State—minerals, water for irrigation and power, forage, and timber. National forests (fig. 1) occupy most of these high mountain ranges, hemming in the populous valleys of the State, and national forest resources are perhaps more part and parcel of the life of the people in Utah than in any other State. The close relationship existing between the national forests and the centers of population is also reflected in the fact that Utah is the only State in the Union that has national forest land in every county.

The Fundamental Wealth of Utah Comes From National Forest Lands

In the interest of public welfare all the resources of these mountain lands—timbered or not—must be wisely handled. A let-alone policy will not do, nor will management that deals with only one resource. It is the job of the Forest Service to manage all these mountain resources in such a way that they may insure the prosperity of the whole State.

Management of All National Forest Resources Essential to Public Welfare.

LOCATION AND EXTENT OF NATIONAL FORESTS IN UTAH

The national forests of Utah are not extensive as compared to those in the other western mountain States, except Nevada (see map, fig. 2), totaling only about 7½ million acres, which is, by the way, a little greater than the total farm area of the State (5 million acres). National forests usually occupy the high mountain ranges the crests of which exceed 8,000 feet, although they generally extend down nearly to the foot of the range—in some instances as low as 5,000 feet. On most mountain ranges which fail to reach an elevation of about 8,000 feet, no national forests have been created as there is no nucleus of timberland to form the basis of a national forest unit which could be administered economically.

The National Forests of Utah Are Found Mainly in a Line Down Through the Middle of the State, where the Mountains Exceed 8,000 Feet in Elevation.

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Most of the mountain ranges of this type are those that break the continuity of the "deserts" of western Utah. Rainfall on them is materially less than at equal elevations on the higher mountain ranges, and timber growth is accordingly poor.

Figure 3 shows how completely national forests cover the mountain ranges exceeding 8,000 feet in elevation. The chief reason why

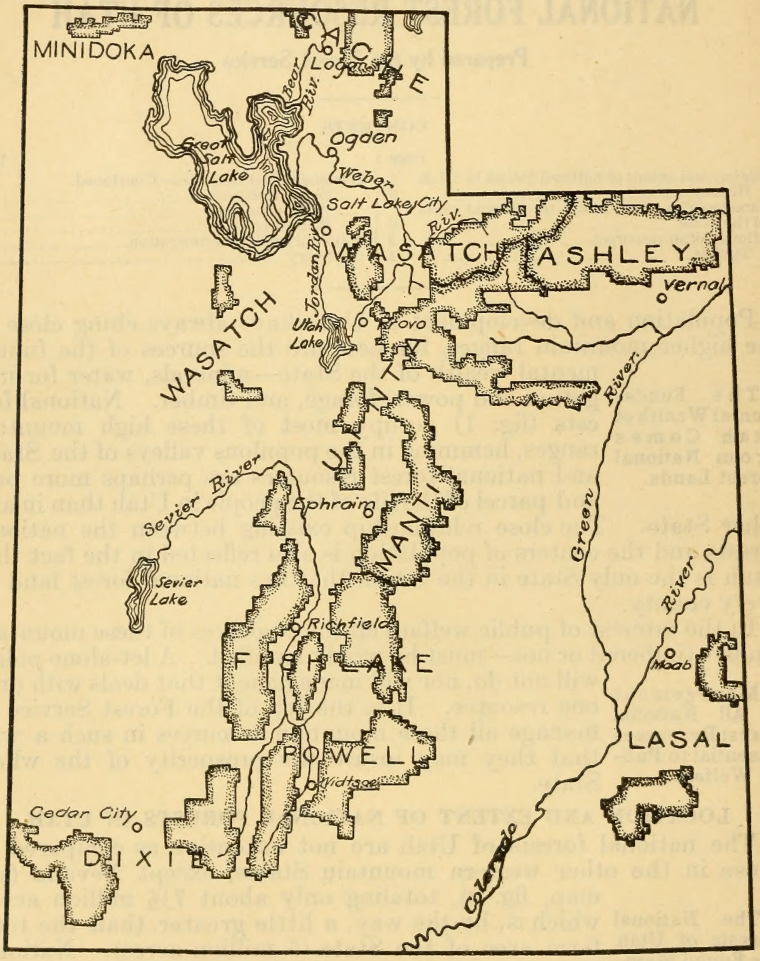

FIG. 1.—The national forests of Utah

the higher mountains of northern Utah, such as those extending from Salt Lake City to Ogden and thence northward, are not included in any national forest is that they lie within the boundaries of the grant to the Union Pacific Railroad, which was given alternate sections in strips 20 miles wide on each side of its right of way. Other lands were granted to the State, and still others have been

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acquired by private individuals in one way or another, until the area of public domain left is so small as to render economical forest administration impossible. In the Oquirrh Mountains, west of Salt Lake Valley, the mineral deposits have been so extensive that a vast series of mining claims covers practically the whole range. In other scattered ranges the timbered area is very small, since climatic conditions are such that considerable areas more than 8,000 feet high are exceptionally dry and in spite of their elevation bear only small, broken stands of timber.

Even inside national forest boundaries not all the area is administered by the Forest Service, as there are "school sections," mining claims, homesteads, and lands acquired by private interests prior to the creation of the forests. Of the 7,991,300 acres included within Utah national forest boundaries, 536,230 acres (6.7 per cent) belongs to the State, private individuals, and corporations.

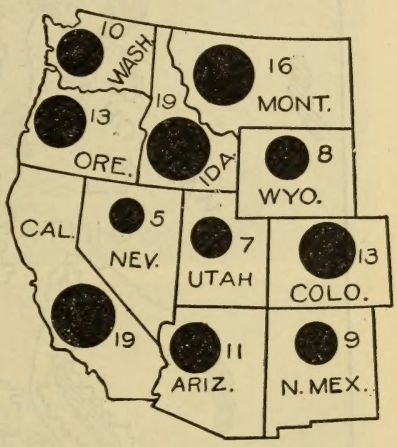

FIG. 2.—National forest areas in the Western States. The black circles indicate the national forest areas; the figures, millions of acres in the national forests

HISTORY

The national forests of Utah were not created in a single day or year. They had their beginning in 1897, when President Cleveland set aside the Uinta Forest Reserve, covering the greater part of the Uinta Range. In 1899 and 1901 President McKinley issued proclamations which marked the beginning of the Fishlake Forest and the Nebo division of the present Uinta Forest. Under President Roosevelt the proclamations became more frequent and included greater areas, so that by 1906 at least a nucleus of all the national forests in the State to-day had been established. Since that time there have been minor additions and eliminations—areas which upon more careful examination proved to be more valuable for agriculture than for forests, and there have also been consolidations and other changes in boundaries for the more economical administration of national forest areas. On June 30, 1925, national forest land in Utah totaled nearly 7½ million acres, distributed among eight national forests almost entirely within the State, and two others the major portions of which lie in Idaho. The headquarters and areas of these forests in Utah are as follows:

Forest	Headquarters	Area in Utah	Forest	Headquarters	Area in Utah
		Acres			*Acres*
Ashley	Vernal, Utah	979,739	Minidoka	Burley, Idaho	70,155
Cache	Logan, Utah	282,803	Powell	Panguitch, Utah	1,050,462
Dixie	Cedar City, Utah	795,884	Uinta	Provo, Utah	1,076,978
Fishlake	Richfield, Utah	1,362,600	Wasatch	Salt Lake City, Utah	608,261
La Sal	Moab, Utah	504,291			
Manti	Ephraim, Utah	723,897			7,455,070

CHARACTERISTICS OF THE FORESTS IN DIFFERENT PARTS OF THE STATE

Utah national forests in general are characterized by lower timber values than most of the national forests in neighboring States and

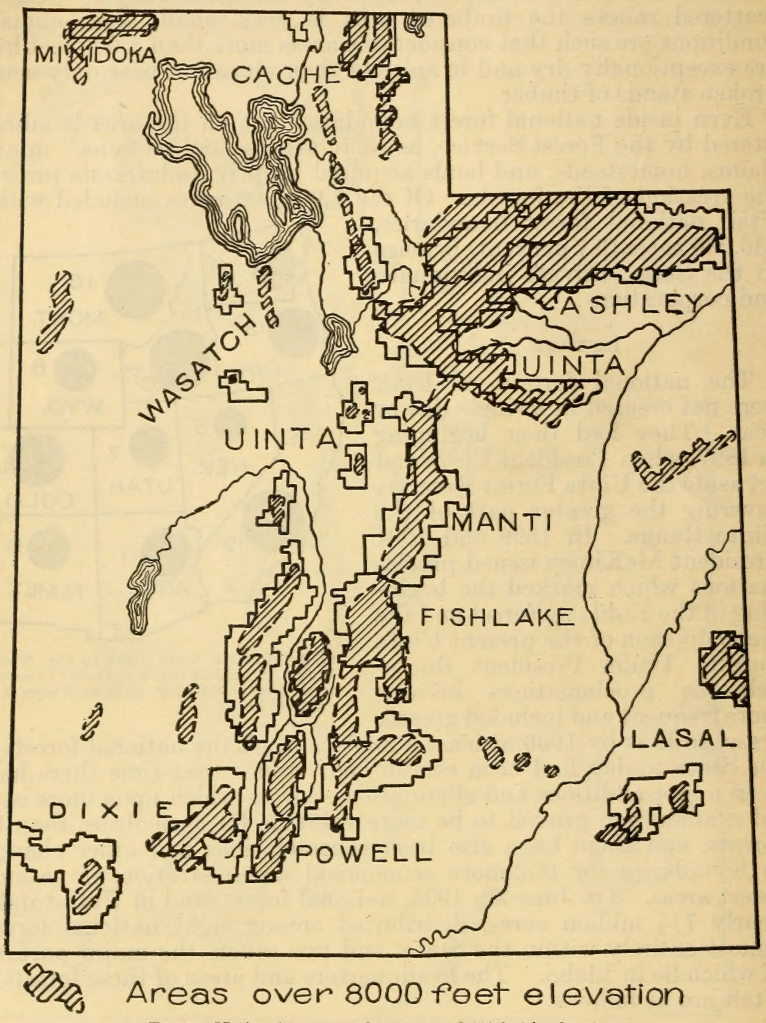

FIG. 3.—National forests and areas over 8,000 feet in elevation

by larger areas on which there are no stands of evergreens. Forests in different parts of the State are widely dissimilar in this respect, however, as some bear extensive dense stands, whereas others are very open. Then, too, the general appearance of the timberland and the surrounding untimbered country changes entirely as one passes from one part of the State to another. Differences in climate, topography, and soil, as well as human activities, have given rise to these variations.

The Character of the National Forests in Different Parts of Utah Varies with the Climate and Topography.

At the north end of the State is the Cache National Forest (fig. 4). The greater part of it, however, lies over the boundary in Idaho. The Bear River Range, upon which the Utah portion is situated, is

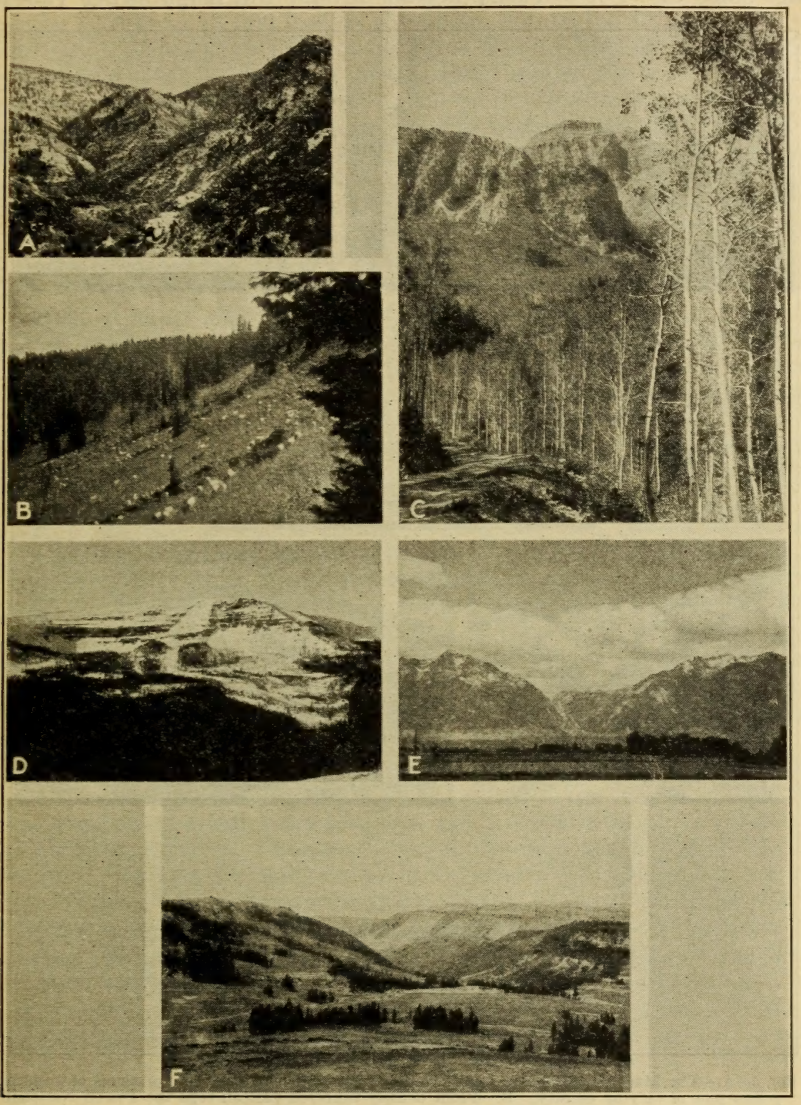

FIG. 4—A.—Many of the short canyons descending into the Cache Valley in the Cache National Forest are marked by scanty timber heavily cut over. B.—The more remote parts of the Cache Forest are still well timbered, although the bodies of timber are small and are separated by extensive grazing lands. C.—Among the rough Wasatch Mountains are many patches of aspen and evergreen timber. D.—Lofty ridges surrounded by extensive forests of lodgepole pine and spruce characterize the Uinta Mountains. E.—The Wasatch Range, upon which are situated parts of the Wasatch and Uinta Forests, rises abruptly from fertile, level valleys. F.—The high Wasatch Plateau, on which is located the Manti National Forest, contains scattered stands of evergreen and of aspen

a plateau—chiefly limestone—presenting a bold front broken on the Cache Valley side by short, steep canyons, but sloping off more gently to the east. Although considerable areas are covered with

aspen, the forest contains an unusually small proportion of land bearing evergreen forests. The amount of timber is now very small, as this region has been subjected to long-continued and severe cutting, since all of it is easily accessible and the neighboring valleys

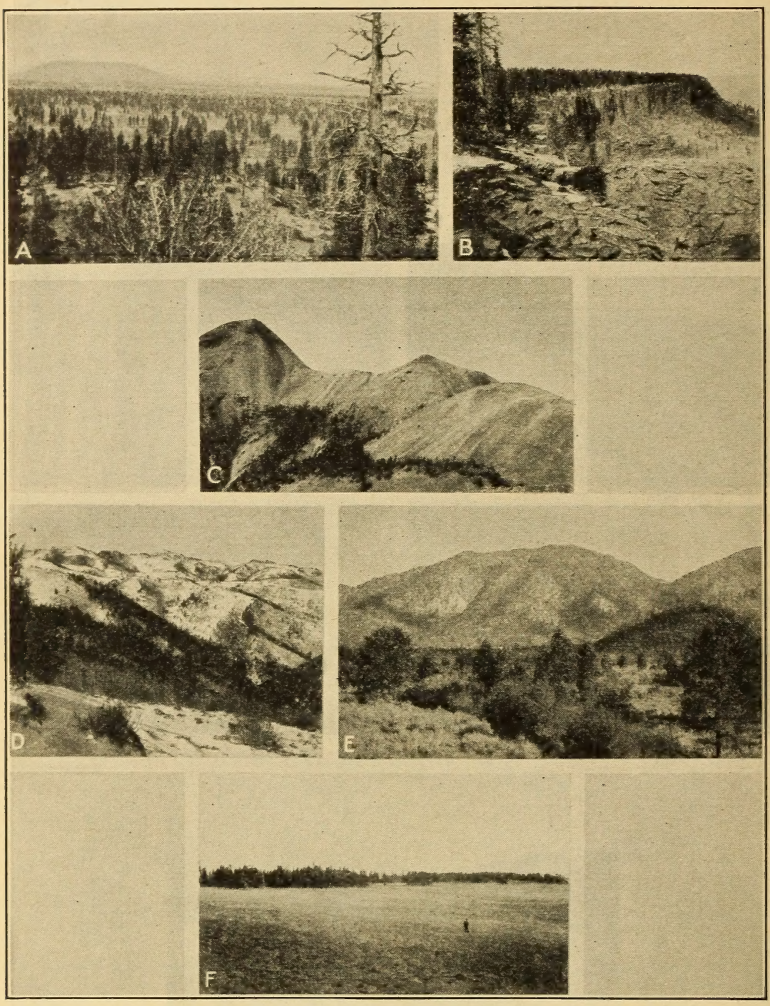

FIG. 5—A.—The Markagunt Plateau (Dixie National Forest) is characterized by stands of western yellow pine of varying density. B.—From densely timbered plateau tops the Powell National Forest drops down sheer lava cliffs to broken country timbered mainly with western yellow pine. C.—In the Tushar Range (Fishlake National Forest) the plateau is buried in deep flows of light-colored eruptive rocks forming bold, barren peaks. D.—Fishlake National Forest lies on a series of more or less broken plateaus whose slopes are marked by much open land and scattered patches of timber. E.—The Pine Valley Mountains are volcanic uplifts, on which are concentrated most of the scant timber stands of the western division of the Dixie Forest. F.—In parts of the Fishlake National Forest the plateaus are flat and bear stands of timber interspersed among openings

have been settled for many years. Under protection, however, a vigorous new stand is rapidly developing.

The Bear River Range extends southward from the Cache National Forest, but neither there nor on the northern spur of the Wasatch

Range have national forests been created, as the grants made to the Union Pacific Railroad left very little public land in those localities.

Against the Wyoming line lies the Uinta Range, a broad, high uplift whose central crest has been boldly carved by glaciers into peaks 12,000 to 13,000 feet in elevation, connected by ridges almost as high. These high crests are above timber line, but in the lake-studded glacial basins and lower down occur the most extensive solid bodies of timber in Utah. The predominating tree is lodgepole pine, although Douglas fir, Engelmann spruce, alpine fir, and, at the lower elevations bordering the forest, western yellow pine, are also present. Lodgepole pine covers at least twice the area occupied by all the other evergreens together. On the eastern end of the Uintas is located the Ashley National Forest; the northwestern shoulder forms a part of the Wasatch National Forest; and the Uinta National Forest extends up on to the southwestern portion.

West of the Uinta Range lie the Wasatch Mountains, rugged and picturesque, all of which, except the part lying north of Salt Lake City, are covered by national forests (fig. 5). These steep mountains are cut by deep short canyons and have many high rocky peaks. Their timberlands, never very extensive, now consist for the most part of young stands, as these forests were drawn on very heavily for timber in the early days by settlers in the Salt Lake and Utah Valleys.

West of the Wasatch Range begins the long series of "desert mountains"—narrow, north and south trending ranges—which are characteristic of the country westward through Nevada. They are generally low and decidedly arid and support few or no forests. Only the parts of the ranges lying next west of the Oquirrh Mountains contain national forest lands—two small divisions of the Wasatch Forest. Even on these divisions timber values are very low, the forests being valuable chiefly for regulating the scanty stream flow, upon which the surrounding ranches are entirely dependent.

East and south of the Wasatch Range stretches the great series of plateaus that, hemming in the Uinta Basin on the south, extends eastward to the Colorado line and southward through the center of Utah into Arizona. Some of these plateaus are tilted, folded, or faulted. Others lie horizontal and apparently unaffected by geologic forces. A few are more or less buried in lava. Except in these last-mentioned cases, they consist of rather easily eroded sedimentary rocks. Wherever they are high enough to get sufficient rainfall to support timber or to be the source of streams important for irrigation, national forests are to be found on them, as Figure 1 indicates. Though all these plateaus have a general family resemblance, their forest characteristics change, not only with minor geologic differences but also with differences in climate and rainfall.

Figure 6 indicates these differences in forest and other growth, resulting from differences of topography, geology, and climate. Because the national forests represent administrative rather than natural units, in such cases as the Wasatch Forest, for example, the average of conditions on the several dissimilar areas is shown in the diagram, rather than the characteristics of any part of the forest. Nevertheless, in spite of this composite treatment of some forests, the diagram brings out the essential differences between the various

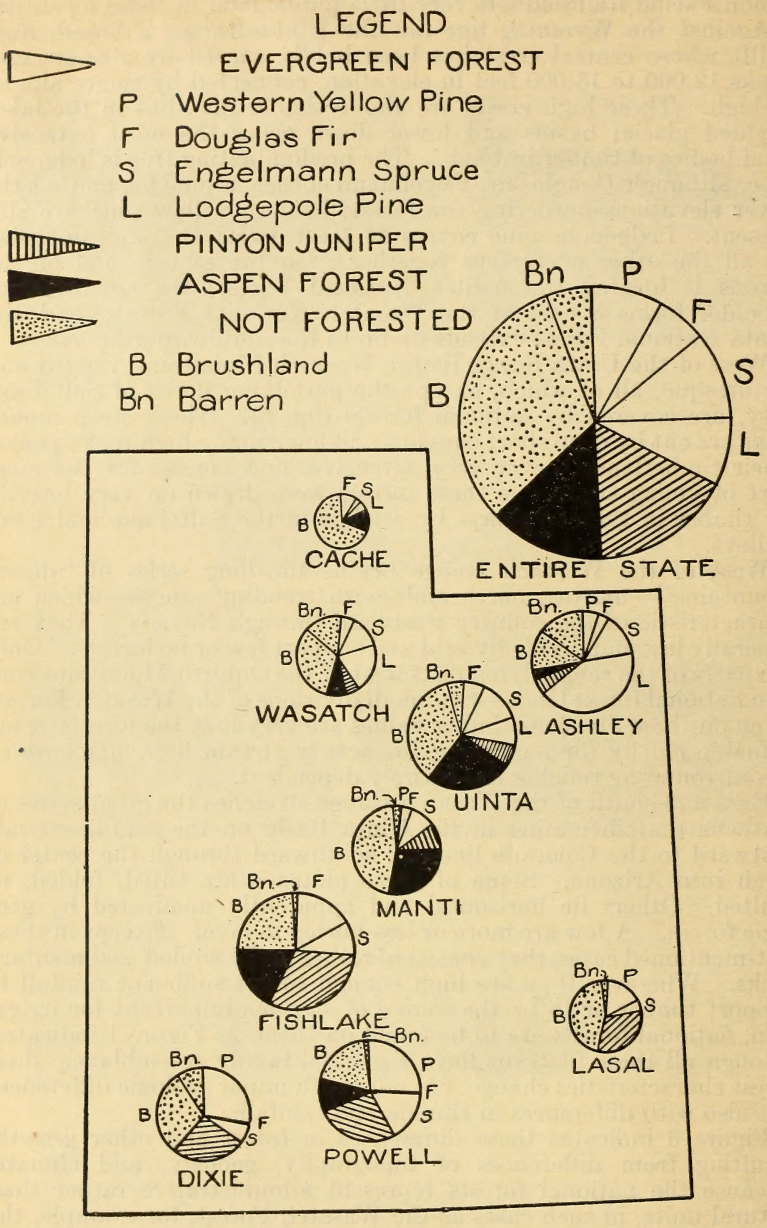

FIG. 6.—Types of vegetation on the national forests of Utah. Each small circle represents the area of the national forest named and the large circle the total of all the forests in the State. In connection with this and subsequent diagrams, note that only a part of the Cache National Forest lies in Utah and that data for the small portion of the Minindoka lying in this State are entirely omitted

national forests of the State. Note, for example, the importance of lodgepole pine in such a forest as the Ashley and its entire absence in the greater number of forests; the importance of western yellow pine and piñon-juniper woodland in the forests of southern Utah; the large areas of aspen in those in the central part of the State; and especially the large areas of brush and grassland scattered very generally throughout all these forests. A study of this diagram gives a clear-cut idea of both the actual composition of the national forests of Utah and the geographic distribution of the various types of vegetation.

NATIONAL FOREST RESOURCES

TIMBER

EXTENT AND LOCATION

Timber resources of Utah Are Relatively Small.

Although Utah has 5,452 million board feet of timber which could be cut from trees over 12 inches in diameter 4½ feet from the ground, the amount is decidedly low in comparison with that in the surrounding States with the exception of Nevada. Figure 7 shows more specially how the national forests of this State compare with those of other States in regard to timber resources.[1]

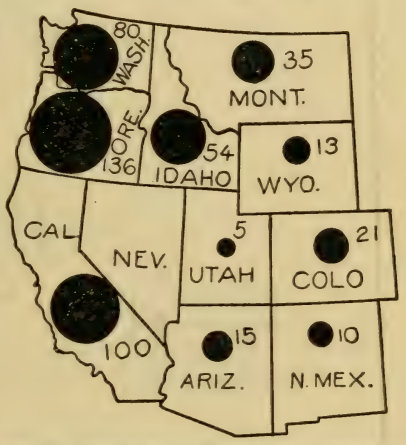

FIG. 7.—Map of western United States showing relative stands of national forest saw timber in different States. Black circles indicate stands of national forest timber; figures, billions of feet of timber

In addition to trees now of sawtimber size, it is estimated that there is in the national forests of Utah 2,316 million board feet of smaller material in trees 4 to 12 inches in diameter 4½ feet from the ground. As much of this is upon old burned areas in the lodgepole-pine region of the Uinta Mountains or upon the heavily cut-over areas in the mountains, it has considerable significance for the future; the area producing timber in the mountains of Utah will increase notably, and the amount of immature material which will ultimately become merchantable assures the State an even greater production of timber than it has at the present time.

There are four main evergreen species of commercial value for saw timber in Utah—western yellow pine, Douglas fir, Engelmann spruce, and lodgepole pine. Stands of these species are scattered very unevenly over Utah forests; Figure 8 shows the relative proportion in each forest.

[1] The timber resources of Utah have been computed as including the stands on the Utah portion of the Cache National Forest, the total stands of the three national forests having relatively small areas extending into adjoining States, and excluding the stands on the Minindoka National Forest.

First in Quantity—Engelmann Spruce—a Tree of High Elevations.

Engelmann spruce constitutes the greatest part of the total quantity, 1,679 million board feet. It grows in the higher mountains all over the State at altitudes where rainfall is heavy. Accordingly it is often found in dense stands and grows to large size. The most extensive stands are found in the Uinta Mountains and on the Aquarious Plateau in the Powell National Forest. The wood is light and fairly strong, very similar in quality to most other species

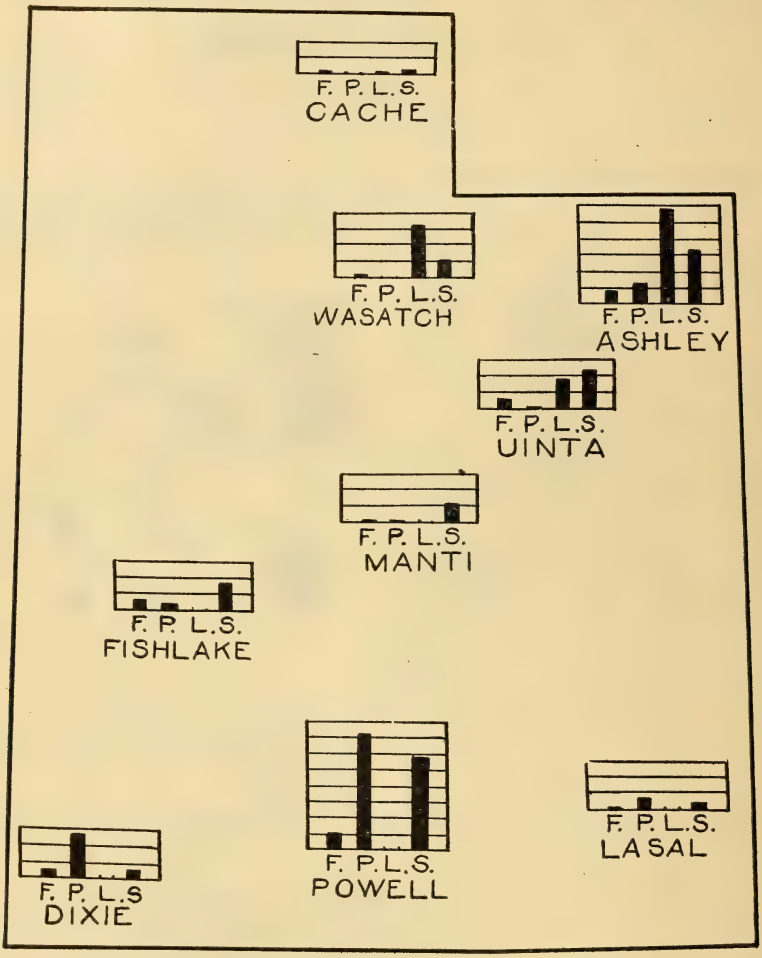

FIG. 8.—Stands of the four main species of timber in Utah, by forests. F.—Douglas fir. P.—Western yellow pine. L.—Lodgepole pine. S.—Engelmann spruce. Scale: Vertical space equals 100,000,000 feet board measure

of spruce found in the United States. Since it is limited to the higher and more remote mountains, it is not well known. The local logger calls it "white pine," for much of it is of excellent quality and yields first-class lumber not unlike the true white pine in appearance and texture.

Next in quantity is western yellow pine, totaling 1,272 million board feet. This species is limited almost entirely to southern Utah, being found extensively on the Powell, Dixie, and La Sal National Forests. Another important body is found on the eastern tip of the Ashley National Forest in the Uinta Mountains. This wood is of excellent quality, the better grades ranking well up to white pine. It is soft, straight grained, easily worked, and has a yellowish tint. It is the common "pine" lumber found in the lumber yards, although at present most of the supply of western yellow pine in the yards comes from Oregon. Because it grows at low elevations it is easily logged and many small mills throughout southern Utah are cutting this timber for local consumption. Practically half of the Utah cut of lumber is western yellow pine. The regions in which it grows are far from railroads, however, and as yet the demand for it is only local.

Next, Western Yellow Pine Characteristic of Southern Utah.

Nearly as great as the supply of western yellow pine is that of lodgepole pine, stands of which total approximately 1,123 million board feet. Practically all of it is found in the Uinta Mountains, where it forms the most extensive bodies of timber in the State. The trees are tall and slender and do not attain a very great diameter. The wood is moderately strong. Because of the form and size of the trees and the character of the wood, lodgepole pine is exceptionally valuable as railroad ties, and the smaller trees make excellent mine props. Some of this timber is accessible, as it may be driven down such streams as the Bear River and some of the forks of the Green River to points on the Union Pacific Railroad in Wyoming. The remainder must remain inaccessible until other methods of transportation or new markets are developed.

Lodgepole Pine, Characteristic of the Uinta Mountains, Occupies Third Place.

Fourth in order, Douglas fir timber amounts to 405 million board feet, decidedly less than any of the other three species. It is, however, far more widely distributed than any of the other evergreens in the State, and is found in small quantities almost everywhere. In the more accessible forests bordering on the Salt Lake, Utah, Sanpete, and Sevier Valleys, it has been heavily cut, as it grows fairly low in the mountains. In a certain measure its accessibility accounts for its scarcity, although even originally it was rarely found in extensive pure stands (fig. 9).

Douglas Fir is the Most Widely Distributed.

The remaining species are of secondary commercial value and are not included in Figure 8. Alpine fir, generally known as white balsam, is the most widespread of these and totals 160 million board feet. This is one of the least valuable of evergreen trees, as the lumber is brittle and of rather poor quality. Nevertheless, it has many uses. Alpine fir is widely distributed at moderately high elevations, and is found especially in combination with Engelmann spruce.

Other miscellaneous timber trees aggregate 813 million board feet. Aspen is the most important of these. Not only is about 500 million board feet of it included in the miscellaneous saw timber, but there is also a considerable amount of cordwood—about 3 million cords. At present aspen has very little value, but it makes excellent excelsior,

Alpine Fir, Aspen, and Minor Species Make Up the Remainder.

FIG. 9.—A.—First-quality Engelmann spruce forest at the head of the Weber River. B.—Western yellow pine on the Powell National Forest. C.—Aspen on the Manti National Forest. D.—Typical cut-over land on the Manti National Forest, showing a second growth stand of Douglas fir. E.—Lodgepole pine in the Uinta Mountains being cut for railroad ties. F.—Piñon and juniper woodland (on cliffs in foreground) which extends far beyond the forest boundary of the Manti National Forest eastward toward the Colorado River

wood pulp, and certain types of matches, and because it is an odorless and tasteless wood it is being used to some extent for boxing products such as butter, cheese, and chocolate, which easily absorb flavors. With increasing demands for wood products of this kind, these stands will ultimately have a marketable value. Other species included under the heading "miscellaneous timber" are white fir (locally known as black balsam), blue spruce, and limber pine.

Aspen of Value for Special Purposes.

In addition to these strictly timber trees there are two lesser kinds of evergreens which assume considerable importance at low altitudes, both within and outside national forests—piñon pine and juniper. It is estimated that within national forests there is at least 4 million cords of this material, which is used chiefly for firewood and posts. The amounts outside national forest boundaries have never been estimated, but must total many million cords. Since, however, this material in many instances is inaccessible and has only a local use, these stands play little part in the Utah timber situation.

Piñon Pine and Juniper Cover Vast Areas, but Have only Local Value.

TIMBER CONSUMPTION

Accurate statistics on the consumption of timber are not available, but rough figures indicate that Utah uses between 175 and 200 million board feet of forest products annually, divided approximately as follows:

TABLE 1.—*Annual consumption of timber in Utah*

Use	Quantity
	Board feet
Lumber, including sawed material used in mines	130, 000, 000
Props for coal mines	7, 000, 000
Railroad ties	25, 000, 000
Fuel and miscellaneous cordwood	20, 000, 000
Posts, poles, etc	6, 000, 000
Total	188, 000, 000

To balance against this consumption there is in the national forests of Utah 5,452 million board feet of saw timber, together with over 7½ million cords of small aspen, piñon, and juniper, useful for fuel, poles, and posts. As the 7½ million cords is equivalent to approximately 2½ billion feet of saw timber, the State has a total stand of national forest timber approximately 40 times its annual consumption.

UTILIZATION

At present only slight use is made of the timber resources of the State. According to estimates based on 1920 and 1921 figures, only about 37½ million board feet of Utah timber is cut annually. Twenty million feet of this is cordwood; 8½ million feet is props, posts, and poles, and other uses in the round. Only about 9 million feet is saw timber. The entire cut, except approximately 16 million feet of fuel and round material from the juniper woodland

Only 37½ Million Feet Comes from the Local Timberlands.

which extends outside the forests, comes from the national forests. These figures show that the utilization of the local forest timber for lumber is extremely small. If the timber is there, why is it not more widely used? The answer is that it doesn't pay at the present time to log local timber.

The Best Bodies of Utah Timber Are Remote from the General Market.

In the first place, the best timber is the least accessible. Figure 8 shows what great amounts of timber are centered on those forests lying either in the Uinta Mountains or in the extreme southern part of the State. Most of those regions are far from railroads, have inadequate transportation facilities, and are far from markets. In the remaining forests the best timber is located in relatively inaccessible pockets, for the adjacent valleys were settled early and the mountains close at hand were combed for their timber supplies many years before the railroads brought in material from the Northwest.

The Efficiency of Big Operations Makes Local Competition Difficult.

Another reason why only scant use is made of local timber resources is the fact that the products of northwestern operators now dominate the Utah field through the advantage of large-scale production and the wide variety of uniformly manufactured products, such as flooring, ceiling, lath, and finish of all kinds. The small local millman, able to produce only rough or, at best, simply surfaced lumber, is therefore under a big handicap in competing in the general market. In most cases the only territory left him is the scattered settlements far from railroads.

Utah Timber Is of Poorer Quality than that in the Northwest.

A third reason why it does not pay to produce local timber is that it is of somewhat poorer quality than the people in this region have become accustomed to using. In the Northwest timber grows under the most favorable conditions and is straight grained, clear, and easily worked. The Utah timber yields smaller quantities of high-grade material, more boards of narrow width, and more knotty timber, and accordingly has a lower value. These three facts—high producing cost, strong, organized competition, and somewhat inferior quality—explain the small utlization of the native timber. Of the three, the third is of quite subordinate importance, and the first two are likely to become less and less important as time goes on.

PROVISION FOR THE FUTURE

Developments Promise Fuller Use.

A national timber shortage is inevitable. It is being felt in the East at the present time, and the Nation is looking to the Pacific Coast and Northwestern States for much of its timber supply. Under these circumstances prices are bound to rise, the best of the timber will become exhausted, and as this process goes on it will be found that local Utah timber can work into the market more and more. An expansion of the lumber industry in Utah can therefore be expected, especially as normal expansion brings railroads and better transportation closer to the main bodies of timber.

Ultimately the only limit of the industry may be the power of the forests to produce. All national forests are managed with due regard to what is known as "sustained annual yield" of forest units. This means that upon these units there will be no more timber cut each year than grows, so that successive crops can be harvested just as they are on farms. Under such circumstances a permanent industry based upon the productivity of the unit can be established. What the State's sustained annual yield will be is of no immediate concern, as long as the cut remains so low. Nevertheless, it is interesting to consider how much the forests of Utah may be able to produce. A rough estimate, the best available at present, is given in Table 2.

The National Forest Cut will Never Be Allowed to Exceed the Growth.

TABLE 2.—*Estimated possible sustained annual yield, by forests and species*

Forest	Millions of board feet				
	Engelmann spruce	Western yellow pine	Lodgepole pine	Douglas fir	Total
Ashley	3.0	1.5	12.0	0.9	17.4
Cache			.1	.2	.3
Dixie	.8	3.2		.7	4.7
Fishlake	2.0			2.1	4.1
La Sal	.3	.6			.9
Manti	1.5			.6	2.1
Powell	6.5	4.6		1.0	12.1
Unita	3.2		3.3	.7	7.2
Wasatch	1.5		6.1	.4	8.0
Total	18.8	9.9	21.5	6.6	56.8

The forests of Utah can supply nearly 60 million board feet of timber a year of the larger material, exclusive of that which goes into cordwood, posts, etc. This is approximately a third of the needs of the State for the larger material. Under Forest Service management the allowable annual cut will increase, particularly in the forests close to the cities and towns, which were cut over heavily in the early days, and now, with proper protection, are coming back rapidly.

The constant aim of the forest officer is to make the timberlands more productive. This is done by protecting the forests from destructive forces, such as fire and overgrazing, and by so cutting the timber that a better stand than the old one will replace it. Whenever timber is sold by the Forest Service, each tree is marked, and first of all the inferior and wide-spreading branchy trees that are taking up more room than they should are eliminated from the stand, together with the trees that have reached maturity and are ready for the ax. Under such a system the stand gradually improves in quality and increases in density.

Regulated Timber Cutting Increases Growth.

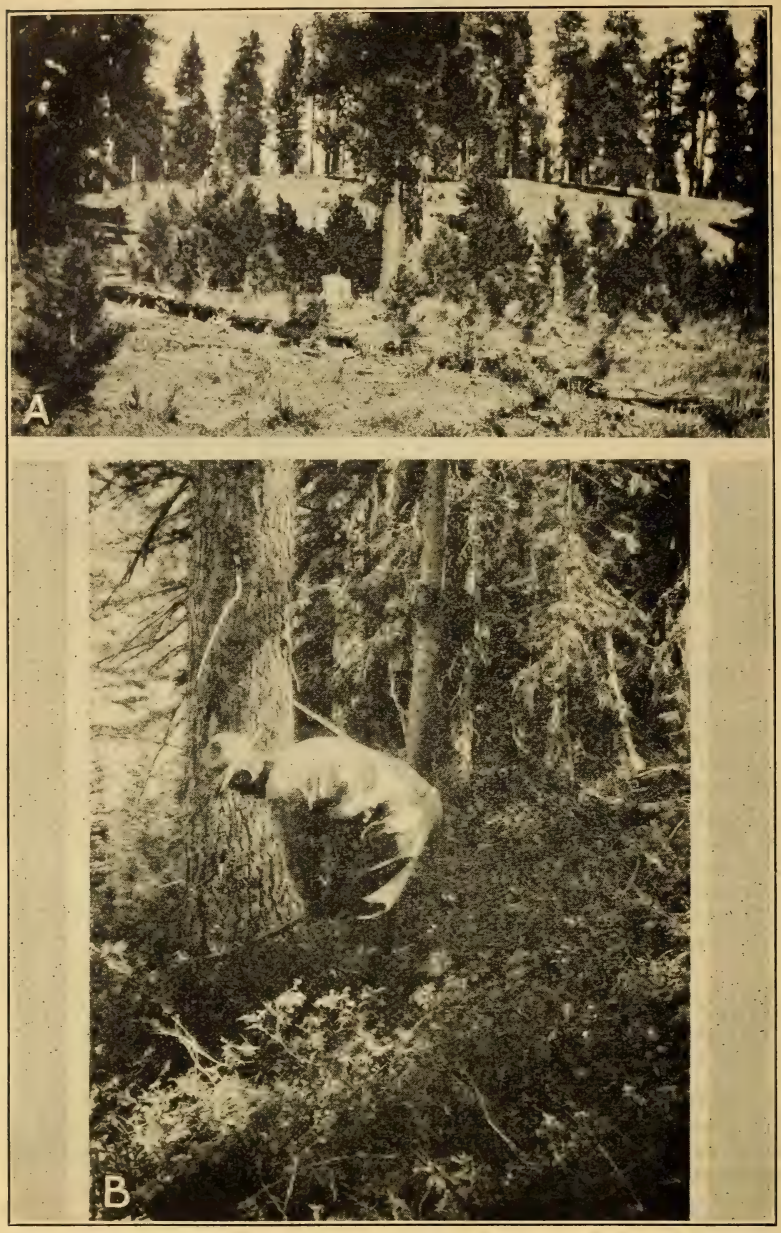

FIG. 10.—A.—Careful cutting leads to vigorous natural reproduction, making the forest denser and more productive. B.—Each tree sold is marked by a forest officer, who sees that all inferior and mature trees are removed first of all

RANGE RESOURCES

In any State that has as much open land within national forest boundaries as Utah, grazing naturally assumes a position of great importance. Contrary to popular belief, properly regulated grazing and timber production are not mutually exclusive. Sometimes, it is true, conditions are such that it is necessary to restrict grazing on limited areas in order to get adequate forest reproduction, but as soon as the young trees are sizable enough to be safe from animal trampling or browsing, grazing can again be allowed (fig. 11).

Grazing and Tree Growing Can Exist Together.

When the size of the national forests in Utah is taken into consideration, the proportional number of livestock grazed there each summer is greater than in any of the surrounding States. Figure 11 shows how important sheep and cattle grazing is in the forests of Utah. Some 157,000 cattle and horses and 750,000 sheep depend on the national forests for forage. In 1923, 28 per cent of the cattle in the State and 32 per cent of the sheep had summer range upon these forests (fig. 12). Not only were the totals of admitted cattle and sheep large considering the national forest area in the State, but the number of owners was exceptionally large. In Utah 6,480 permits to graze cattle upon the national forests were issued, whereas in no other State did the number of permittees exceed 4,000. In addition 1,780 permits were issued for grazing sheep on Utah national forests. This was more than twice the number in any other State. The approximate value of these herds of cattle and flocks of sheep was $10,000,000.

The Forests of Utah Support Large Herds—The Ownership Is Widely Distributed.

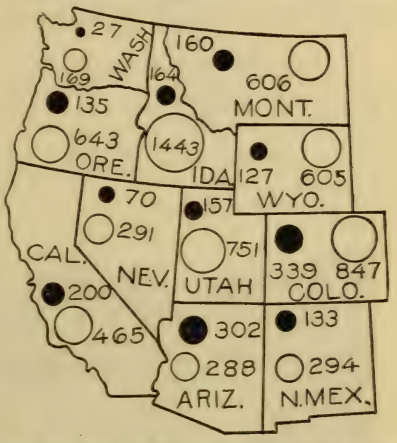

FIG. 11.—Map of Western States showing grazing on the national forests. Compare this map with Figure 2, showing national forest areas in each State. Black circles indicate cattle and horses; white ones, sheep and goats; figures, thousands of stock

Although not always thought of in connection with national forests, forage is one of their important resources (fig. 13). It is obvious that all the resources of the land within the national forests should be used to the best advantage, and that if grazing were not allowed a tremendous economic loss would result. On the other hand, forage is so tied in with other forest resources—watershed protection and timber production in particular—that unregulated grazing, such as exists on the public domain, is not permitted on the national forests, as the risk of destroying these related resources is far too great. The national forest grazing regulations have two main purposes: (1) To conserve the range and other resources of the national forests, and (2) so to distribute grazing privileges that they may be of maximum public benefit.

Grazing Is Regulated.

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Regulations and Cooperation Protect the Range from Overgrazing.

Among the regulations which provide for the conservation of range and allied resources, of primary importance is the regulation that only a certain number of stock shall be admitted to the forest and that they shall be grazed upon designated areas. The time when the stock are admitted to the forest ranges and the time they leave are also regulated, in order to prevent the destruction of the forage. Grazing early in the spring, when the ground is soft and the grass just springing up, would ultimately destroy all the range value of the land. Other regulations provide for the handling of the stock so that the range may be evenly and fully utilized. The essentials of range management are provided for in the national forest regulations, but a great many range improvements are the result of voluntary cooperation between the stockmen and the Forest Service. Throughout Utah the stockmen are organized into local stock associations, which act as a unit in cooperating with the Forest Service, and through them first-class range management is being achieved.

FIG. 12.—Grazing is an important use of the open lands within national forests

Not all the national forests of Utah are used equally for grazing, as some have much larger proportions of grazing land than others. Furthermore, some are heavily used by cattle and horses and lightly by sheep, while on others the situation is reversed. How the livestock are distributed among the forests is shown in Figure 13.

WATER RESOURCES

Irrigation Water Comes chiefly from National Forests.

Irrigated farming is the backbone of Utah agriculture. Eighty per cent of the improved farm land, or nearly 1½ million acres, is irrigated. These lands produce crops worth $50,000,000 annually. The greater part of the water used in irrigation comes from mountain watersheds which are included within the national forests. The heavy rainfall on the mountains is not due to their being forested—it is the rains that make the forests.

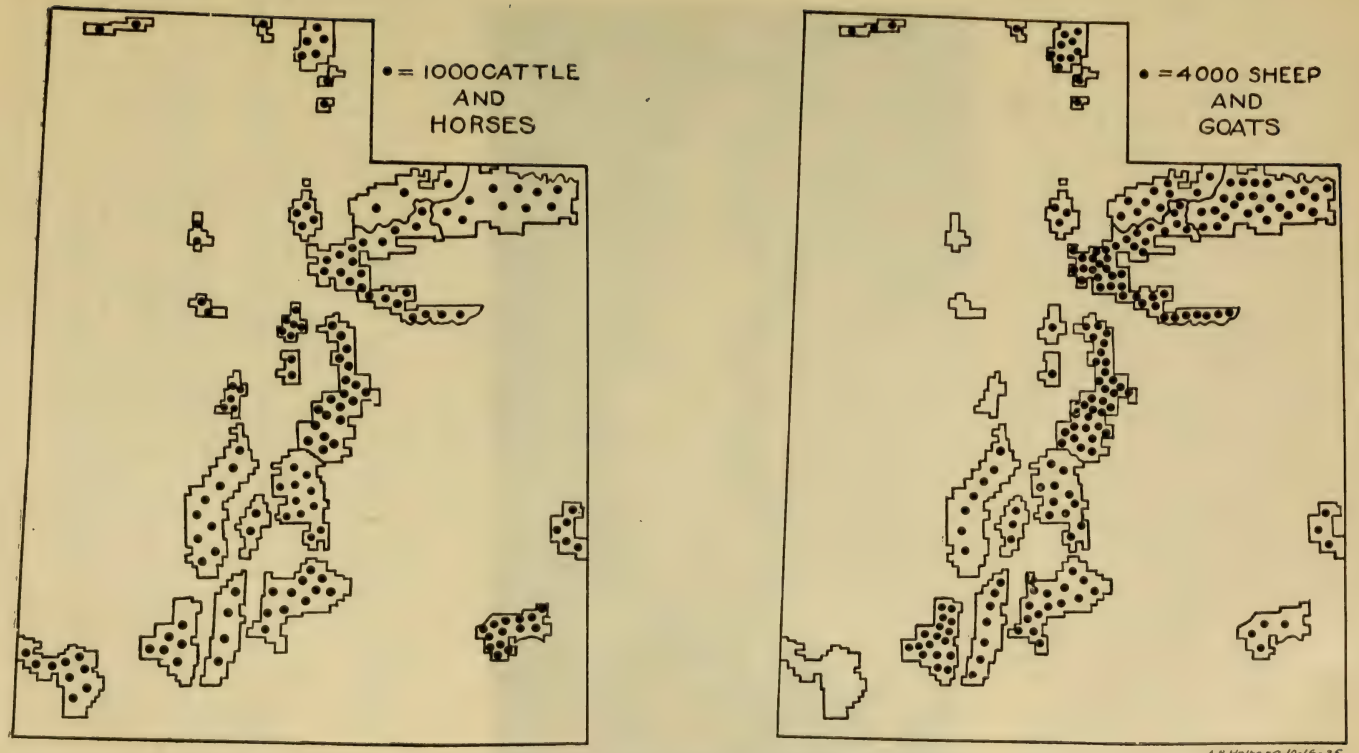

FIG. 13.—Grazing of cattle, horses, and sheep on the national forests of Utah

The heavy snows of winter would accumulate on these mountains even if they were not forested, and the summer rains would fall most heavily there. When it comes to the run-off from these watersheds, however, the character of the cover has a very marked effect upon the usefulness of the water. From forested mountains come clear streams having far less violent fluctuations from time to time than streams from unforested mountains and, in general, having a later and more extended period of high water. The total amount of water coming down out of the mountains is doubtless somewhat less here than in regions where the mountains are deforested, but it counts for much more. It has greater crop-producing power.

Water from Forested Mountains Is Useful.

Studies made at the Utah Agricultural Experiment Station show that early water has much less effect in determining the size of crops

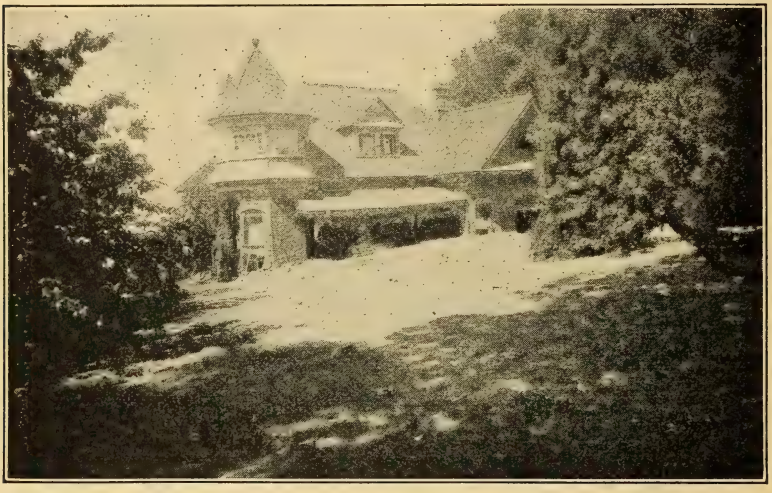

Fig. 14.—The work of a Utah flood

than later water. In the case of grain, for instance, water at the time of the formation of the grain is essential to a large crop. With sugar beets, carrots, and other root crops, water in July and August is of exceptional value, and in the case of the all-important alfalfa, irrigation at the time of the second cutting is necessary to get a good third crop. Adequate later water is contingent on watersheds protected by a vegetative cover.

Denuded watersheds are subject to erosion, which brings about high maintenance charges for ditches, canals, and similar improvements, as they continually fill with silt and sand and require constant attention. The maintenance of reservoirs in such streams also becomes extremely difficult, and in some instances the accumulation of silt renders the reservoirs entirely useless.

The most destructive form of erosion is that resulting from heavy summer thunderstorms in the mountains and consequent floods. The dashing rain water runs rapidly over the unprotected ground, cutting little rills and becoming thick and muddy almost instantly. These muddy rills running together form a thick mass that moves with difficulty down the canyon bed, gathering behind it an immense head of water. Banks are undermined, and rocks, trees, and tons of earth are added to the tremendous moving, rolling mass that, proceeding down the canyon, tears out everything in its course. Finally, when the open land at the mouth of the canyon is reached, the water spreads out with almost explosive violence, covering fields and orchards, destroying everything that stands in its path (fig. 14), and hurling here and there enormous rocks. Damage amounting to many thousands of dollars has been done in Utah by floods of this kind. It can not be claimed that proper watershed protection is absolute insurance against such floods, for the rainfall may be extremely violent. Nevertheless, there is abundant proof that proper watershed protection does much to minimize the destructiveness of such run-off and in most cases will prevent the floods.

Vegetation on Watersheds Reduces Floods.

The damage resulting from too rapid run-off is not confined to the irrigated land in the valleys. The mountains themselves suffer. The rich topsoil, developed by ages of decaying vegetable matter, is washed away, leaving a barren and sterile suboil in which neither trees nor forage develop normally.

The same thing that has been said of irrigated farming applies to hydroelectric developments. They become expensive and indeed virtually impossible on streams that are muddy or subject to violent fluctuations and floods. The close relationship between irrigated farming, hydroelectric developments, and the national forests is shown in Figure 15.

Hydroelectric developments demand Watershed Protection.

Fire and overgrazing are the two great dangers to watersheds. Overgrazing has been obviated through provisions for proper range management, and fires of any size are extremely rare within these national forests. The average area burned over annually during the nine years from 1916 to 1924, inclusive, was 3,023 acres out of a total of 7,455,070 acres in the national forests of Utah.

Fire and Overgrazing Destroy Watershed Values.

RECREATION

Recreation is an exceedingly popular by-product of the national forests. Save in very exceptional instances where scenic values are unique and outstanding, recreational uses are incidental to other forest uses. Timber is cut conservatively, as such cutting keeps the forests in a highly productive condition. Brush is disposed of on timber sales, usually through burning, because with it is removed a very real fire hazard, and incidentally the forest floor is left clean and neat. The national forests are grazed lightly and in an orderly manner, not primarily to maintain the mountain meadows

Recreation Is a Great National Forest By-Product.

as green stretches dotted with beautiful wild flowers to delight the eye, but because such management is necessary to the permanent well-being of the great grazing industry and the preservation of watershed cover.

Orderly lumbering, range management, and the preservation of watersheds automatically create conditions under which recreational use can flourish. Such use is encouraged by the Forest Service. Every citizen is welcome to come to the forest and camp upon it, and no special regulations are enforced concerning the extent or manner of this use. The thing he is asked to do above all else is to exercise care with camp fires, and indeed with all forms of fire, including smoking in the forest, for these may readily destroy the very values which campers most cherish.

Campers Are Welcome as Long as They Are Careful With Fire.

In the northern and north-central parts of Utah some of the most popular recreation grounds in the national forests are to be found in Logan Canyon, the canyons on the east of Salt Lake Valley, and the region back of Mount Timpanogos which is approached from American Fork and Provo Canyons. Timpanogos Cave, a national monument within the Wasatch National Forest, is located in American Fork Canyon. In the Uinta Mountains are many beautiful lake regions in high glacial amphitheaters. These are difficult of access, however, except the Granddaddy Basin near the southwest corner of the range, which is easily accessible by horseback. A somewhat similar lake region at the head of the Provo River may also be reached by road.

The most important recreational area to the south is that about Fish Lake, a considerable body of water surrounded by mountains and full of many kinds of trout, with which it is stocked annually. The aquatic vegetation is unusually profuse, so that with plenty of food the fish grow large, and as the waters are clear and cold they become very game and of high quality. Still farther south, the remarkable erosion forms created in the sides of some of the high plateaus are notable scenic centers. Cedar Breaks, on the Dixie National Forest, is such a place, and on the Powell National Forest, Bryce Canyon, a national monument adjoining the national forest, is another popular recreation ground. Beautiful and inspiring scenery and good fishing streams and lakes are scattered generally throughout most of these forests, and everywhere can be found the universal appeal of green forests and ranges properly used.

To those to whom recreation in the forests means hunting and fishing the many national forests offer good sport. Deer are fairly plentiful and are becoming more so. Elk are increasing rapidly. In the high mountains of the Uinta Range there is a scattering of mountain sheep. Fishing is good almost everywhere except on some of the forests of central Utah, where the destruction of watershed cover previous to the establishment of the national forests has resulted in washed-out streams. How closely the interests of national forests and game are united is indicated by the location of the State game preserves in Utah,[2] as shown in Figure 16.

[2] A map showing roads on Utah national forests together with other information for the automobile tourist may be obtained from Forest Service officials in Utah.

NATIONAL FOREST ADMINISTRATION

The management of these national forest properties in Utah is carried out on the ground by 49 rangers, who work under the forest supervisors, each supervisor having charge of a national forest. In addition, specialists of one kind or another are from time to time attached to the supervisor's office to handle technical timber or grazing problems. The forest supervisors report to the district forester at the district office, located at Ogden, under whose juris-

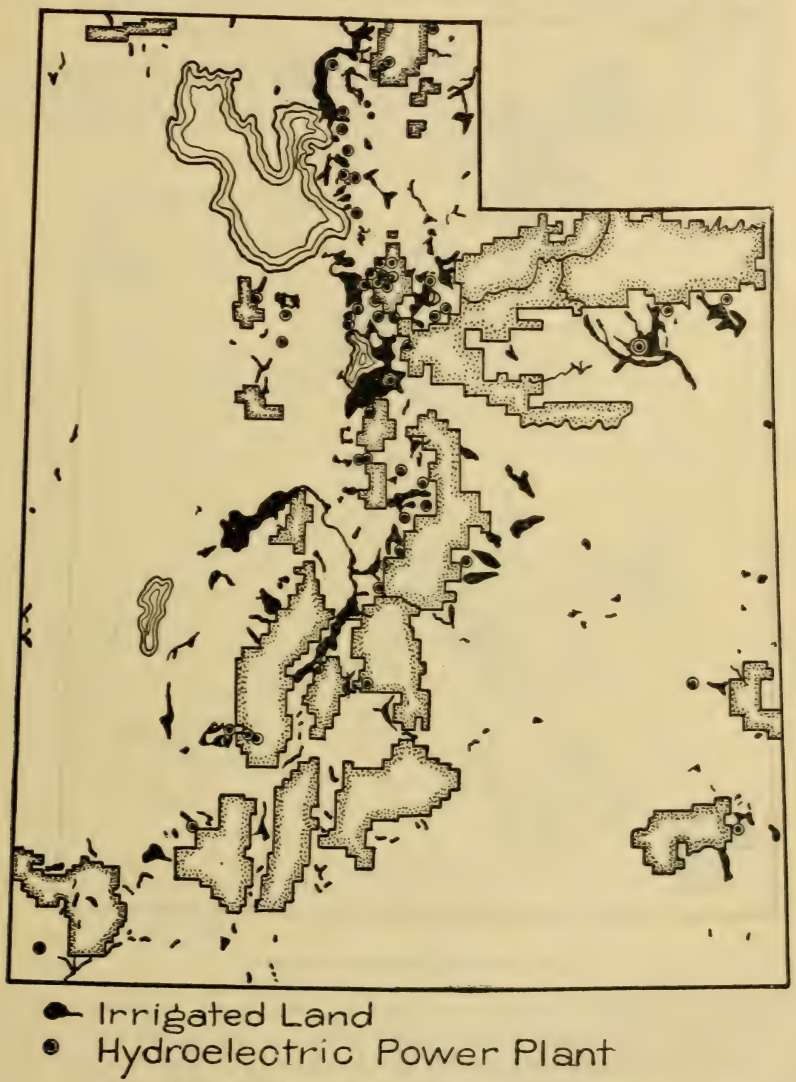

Fig. 15.—Map showing irrigation and hydroelectric plants

diction come not only the forests of Utah but those of the greater part of Nevada, southern Idaho, and a portion of Wyoming. The national forests as a whole are administered under the direction of the chief forester, in Washington, who is directly responsible to the Secretary of Agriculture.

The Forest Service receives an annual appropriation from Congress to carry on its work. The amounts taken in from sales of timber, fees for grazing, and from other sources, go into the Federal Treasury, as do other funds collected by the Government. Forest lands pay no taxes, but a law provides that 25 per cent of the receipts in each State shall be returned to the State and the counties in which the national forests are located in lieu of taxes. As Table 3 shows, in an average year like 1924 the money received through the leasing

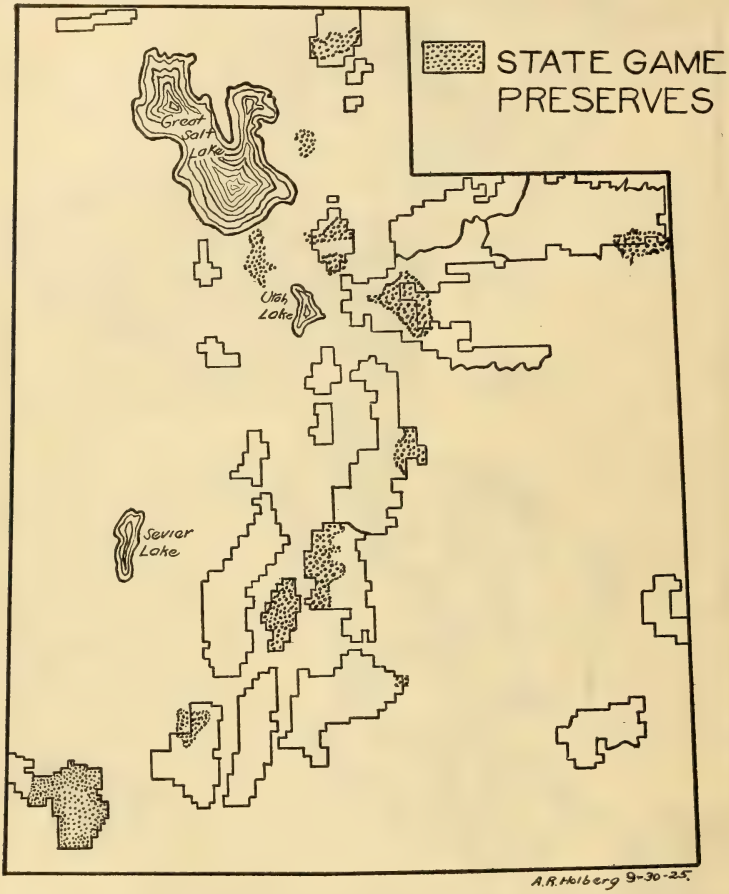

FIG. 16.—State game preserves in Utah

and sale of national forest resources is just about sufficient to pay for the direct administration of the forests—the salaries of rangers and other officers, together with the wages of fire fighters and other similar employees and the amount expended for improvements, such as ranger stations, fences, etc., but not the sum returned to Utah in lieu of taxes, nor the large sums spent annually for roads and trails within the national forests of the State. Most of these forest roads connect important communities on opposite sides of mountains occu-

pied by national forests, and their construction really has little to do with national forest administration or the utilization of national forest resources. If the national forests belonged to companies operating them for profit, many of these roads certainly would not be built. Most of them are constructed as a part of the public responsibility of the Federal Government to the Western States.

TABLE 3.—*Utah National Forest receipts and expenditures*

Average receipts		Average expenditures	
Timber sales	$25, 567. 80	General administration	$223, 746. 82
Grazing fees	199, 745. 42	Improvements	13, 803. 10
Other receipts	7, 449. 08	Roads (Forest Service and Bureau of Public Roads)	417, 354. 54
Total	232, 762. 30	Total	654, 904. 46
		25 per cent of receipts to States	58, 190. 57
		Grand total	712, 095. 03

SUMMARY

The facts and figures in this circular show clearly the two things that especially characterize the national forests of Utah: (1) The closeness of the national forests to the most populous valleys of the State, and (2) the unusual variety of resources that the high mountains occupied by the national forests furnish. How these areas and resources are handled is of fundamental importance to nearly all the people of the State.

It is the aim of the Forest Service to grow and preserve the timber so that as time goes on and timber becomes less plentiful in the United States the valleys of Utah will be able to draw perpetually upon the neighboring mountains for much of their supply.

The national forest administration means that the summer forage crop will be perpetuated, neither lessened by overgrazing nor allowed to go to waste, so that the 157,000 cattle and horses and 750, 000 sheep now dependent upon national forest summer ranges will always find the forage there.

National forest administration means that the streams issuing from the high, forested mountains will be kept as steadily flowing streams, instead of being subject to violent floods after every summer storm and drying up during long hot seasons. Thus they will best serve the public interest, guaranteeing continuous adequate supplies of water for irrigation, domestic use, and the development of hydroelectric power without excessive maintenance charges for reservoirs, canals, and ditches.

Finally, national forest administration means that all these resources will be handled with due regard to their intricate relationships one with another. An absolutely ideal watershed might be considered one which was entirely free from grazing and timber cutting. An ideal range might call for the elimination of brush lands and timber patches. Maximum forest production might conceivably call for the elimination of grazing in certain places, or elsewhere the clean cutting of hillsides followed by planting to other more valuable species. Any of these methods of management of one resource

would mean heavy damage to another; therefore national forest management calls for a balanced plan that will take into consideration all the interrelated forest resources.

When a balanced plan is consistently followed the forests yield their popular by-product of recreation, in addition to supplying timber, forage, and water. Game finds conditions favorable to its increase, the streams and lakes are suited to fish life, and the camper who is there to enjoy the out of doors finds the forests altogether satisfactory.

Through diversified use the forests play their full part in the life of the people of Utah.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

August 24, 1926

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